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POWER COST STUDY

MISSOURI 59 COLE

U. S. UNITED STATES DEPARTMENT OF AGRICULTURE  
RURAL ELECTRIFICATION ADMINISTRATION, Power Division//  
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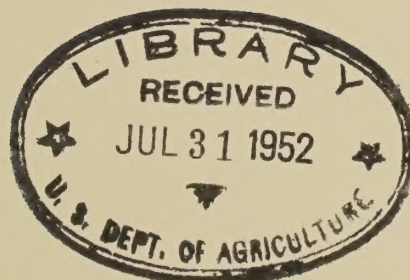
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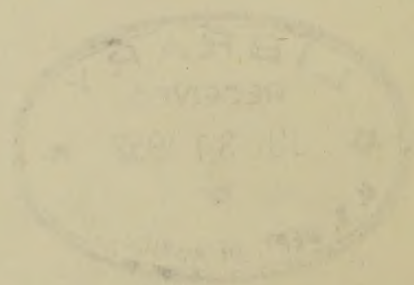
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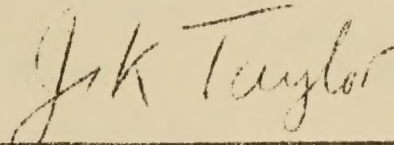






SYSTEM POWER ANALYSISMISSOURI 59 COIE

On November 21, 1949, a loan in the amount of \$2,000,000 was approved for the Sho-Me Power Corporation which, together with previous loans, provided for the construction of a 69 kv transmission system which would be lease-operated by the Southwestern Power Administration. Now that bids have been received for sections of this system, it is apparent that the original loans will have to be supplemented if the construction as originally planned is to be completed. Additional funds in the amount of \$845,000 will be required. However, because of an increase in the load estimates and a decrease in the amount of facilities to be operated by Sho-Me, the average cost of power to serve the allocated load will be 0.635 cents as compared to 0.645 cents in the last study.



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## POWER COST STUDY

### MISSOURI 59 COLE

#### INTRODUCTION

On November 21, 1949, a loan in the amount of \$2,000,000 was approved for the Sho-Me Power Corporation which, together with previous loans, provided for the construction of a 69 kv transmission system which would be lease-operated by SPA. Increasing costs, as evidenced from bids being received, make a supplementary loan necessary so that construction might be completed.

#### CONCLUSIONS

A loan of \$845,500 is required to cover the following:

340 miles, 69 kv transmission	\$2,668,000	
53,750 kva of substation capacity	<u>2,142,000</u>	
Total		\$4,810,000
Previous loans for these facilities		<u>4,159,500</u>
Deficiency		\$650,500
Rehabilitation of existing facilities		<u>195,000</u>
Loan Request		\$845,500

The estimated cost of power while serving the allocated load is 0.635 cents per kwh.

#### LOAD DATA

The allocated load used in the last study, dated October 13, 1949, was 47,300 kw and 194,788,000 kwh. Since that time, loans have been made to some of the distribution cooperatives and the allocated load now is 49,500 and 203,211,254 kwh. A breakdown by cooperative will be found in Appendix I.

#### PROPOSED CHANGES

The lines and substations as originally proposed for the 69 kv system can be found in Exhibits A and B of the October 13, 1949 study. The lines and substations now proposed are shown in Exhibit A and B of this study. These changes are in line with later surveys and board studies.

In the last study, it was assumed that 119 miles of line and 17,050 kva of substation capacity owned by member cooperatives would be transferred to Sho-Me. No agreement could be reached between the members and Sho-Me on these transfers, so these facilities are being omitted from this study. Agreement has been reached with one member cooperative, Missouri 49 Howell, which will transfer to Sho-Me 58 miles of line and 10,100 kva of substation capacity.



Also, \$244,625 held under stop-order but included in the last study for transmission system rehabilitation has had the stop-order lifted and the funds earmarked for distribution facilities. \$195,000 is therefore being requested for rehabilitation of the existing transmission system. Of this \$195,000, about \$16,000 is necessary to convert the existing 10,000 kva Maries substation for 69 kv. In the last study, funds were set up for a new 5,000 kva substation at Maries. Since a new one will not be built, agreement will have to be reached with SPA, if it takes over the existing substation, as to its value in dollars. For purposes of this study, no consideration was given to its being leased by SPA, but it was assumed that it would be operated by SPA; that is, its debt service was not assigned to SPA.

If this loan is approved, funds should be placed under stop-order until the contracts between Sho-Me and SPA are amended to take care of the planned changes and increased costs of the system.

#### COST OF POWER

The cost of power for the allocated load would average 0.635 cents per kwh. This compares with the 0.645 cents in the previous study. The lower cost is due to the fact that less money is being used for rehabilitation, fewer facilities are being transferred to Sho-Me, and the allocated load is higher. If SPA defaulted on its lease agreement and Sho-Me had to operate its entire 69 kv system, the cost of power for the allocated load would average 0.845 cents per kwh, the same as in the last study.

APPENDIX I

LOAD DATA

ALLOCATED KWH REQUIREMENTS

Missouri 18 Texas	26,757,333
38 Reynolds	-
43 Iacleda	31,365,433
45 Osage	2,231,250
46 Taney	3,363,750
49 Howell	12,076,750
53 Polk	2,000,000
54 Crawford	17,191,465
66 Webster	8,122,425
67 Wright	5,510,625
68 Pulaski	5,107,575
Municipalities (Rollo, Cuba, Lebanon, Sullivan, Cabool, Richland)	37,856,898
Retail	<u>51,627,750</u>
	203,211,254 kwh
Allocated Demand - 49,500 kw	







APPENDIX II

INVESTMENTS

Summary

1. Transmission Plant	
340 miles, 69 kv transmission	\$2,668,000
53,750 kva of substation capacity	<u>2,142,000</u>
Total	\$4,810,000
Previous Loan	<u>4,159,500</u>
Deficiency	\$650,500
Rehabilitation of existing facilities	<u>195,000</u>
Loan Request	\$845,500

Transmission Plant

Lines

Willow Springs-Mansfield, Lebanon-Rolls, Willow Springs-Licking  
(145.8)

Labor, Materials, & R/W Clearing	\$882,500
Engineering	44,250
R/W Procurement & Legal	59,000
Contingency	40,000
Overhead	<u>4,250</u>
	\$1,030,000

Mansfield-Ava-Gainsville (45.2 miles)

Labor and Material	\$224,235
R/W Clearing	54,360
Engineering	14,000
R/W Procurement & Legal	18,400
Contingency	27,000
Overhead	<u>3,005</u>
	\$341,000

Cuba-Morrellton (29 miles)

Labor and Material	\$145,000
R/W Clearing	34,800
Engineering	9,000
R/W Procurement & Legal	12,000
Contingency	18,000
Overhead	<u>2,200</u>
	\$221,000

Lebanon-Camdenton (29 miles)

Labor and Material	\$168,000
R/W Clearing	43,500
Engineering	10,600
R/W Procurement and Legal	12,000
Contingency	20,000
Overhead	<u>3,900</u>
	\$258,000

APPENDIX II (Cont.)

Rolla-Cuba, Lebanon-Marshfield, Marshfield-Mansfield (91 miles)

Labor and Material	\$565,000	
R/W Clearing	109,000	
Engineering	33,700	
R/W Procurement & Legal	37,000	
Contingency	66,000	
Overhead	<u>7,300</u>	
		\$818,000
		<u>\$2,668,000</u>

Substations (53,750 kva)

Labor and Material	\$1,850,887	
Engineering	92,543	
Land & Legal	28,000	
Contingency	152,000	
Overhead	<u>18,570</u>	
		\$2,142,000

Transfer, by debt assumption, of following facilities from Missouri 49 Howell

Line

18 miles, 69 kv, West Plains to Willow Springs )

40 miles, 34.5 kv, Willow Springs to Winona )

Substations \$ 615,633.48

7500 kva, 69/33/7.2-12.5, Willow Springs )

2000 kva, 69/33/7.2-12.5, West Plains )

600 kva, 34.5/7.2-12.5, Mountain View )



# APPENDIX III

## ANNUAL EXPENSE ALLOCATED LOAD

1.	Energy at substations	203,211,254
2.	Energy at sources (5% losses)	214,000,000
3.	Energy generated at Niangua	10,000,000
4.	Energy purchased	204,000,000
5.	Peak KW required at substations - non-diversified	49,500
6.	Peak KW required at sources - non-diversified	52,000
7.	Peak KW required at sources - diversified	49,600
8.	Dependable peaking - Niangua hydro	600
9.	Peak purchased	49,000

- A. Annual expense if total requirements, except that generated at Niangua, are purchased from SPA, and Sho-Me operates its own 69 kv system.

### Purchased Power

49,000 kwh @ \$6.60 per kw	\$324,000
204,000,000 kwh @ 0.4¢/kwh	<u>816,000</u>
	\$1,140,000

### Generation (Niangua Hydro)

Operation	\$ 12,500
Maintenance	7,200
Miscellaneous	3,000
Taxes and insurance	<u>9,000</u>
	31,700

### Transmission System

#### Operation, maintenance and replacement

Assumed lines and substations transferred to Sho-Me

40 miles of 34.5 kv line	\$ 3,840
18 miles of 69 kv line	2,300
600 kva of 34.5 KV sub. cap.	600
9500 kva of 69 kv sub. cap.	<u>11,100</u>
	\$17,840
340 miles of 69 kv line	43,500
61,750 kva of 69 kv sub. cap.	72,300
2,000 kva of 34.5 kv sub. cap.	2,000
Breaker stations, switching, and relaying	<u>25,000</u>

\$160,640

Taxes and insurance

50,000

Administrative and general

60,000

\$270,640

### Interest and Amortization

\$729,986 @ 5.8%	\$ 42,300
2,159,000 @ 4.1%	88,500
2,000,000 @ 4.1%	82,000
615,633 @ 4.1%	25,200
845,500 @ 4.1%	<u>34,700</u>

\$272,700

Grand Total  
Cost per kwh at substations (cents)

\$1,715,040

0.845



B. Annual expense if total requirements, excepting that generated at Niangua, are purchased from SPA, and SPA leases Sho-Me's 69 kv system.

1. Energy at substations	203,211,254
2. Energy at sources (2% losses)*	207,500,000
3. Energy generated at Niangua	10,000,000
4. Energy purchased	197,500,000
5. Peak KW required at sources - diversified	48,600
6. Dependable peaking	600
7. Peak purchased	48,000

\*SPA absorbs losses on 69 kv transmission system it leases

Purchased Power

48,000 KW @ \$6.60/kw	\$316,500
197,500,000 kwh @ 0.4¢/kwh	<u>790,000</u>
	\$1,106,500

Generation

(Same as Plan A, above)

Transmission System

Assumed facilities (Same as Plan A, above)	\$17,840
Taxes and insurance	8,160
Administrative and general	<u>50,000</u>
	\$76,000

Interest and Amortization

\$729,986 @ 5.8%	\$42,300
615,633 @ 4.1%	25,250
195,000 @ 4.1%	<u>8,000</u>
	\$75,500

Grand Total	\$1,289,750
Cost/kwh delivered	0.635¢



EXHIBIT A

69 KV LINES

<u>Line Section</u>	<u>Miles - As Loaned</u>	<u>Miles - As Proposed</u>
Willow Springs-Mansfield	47	45.4
Lebanon-Rolla	81	64
Willow Springs-Licking	51	36.4
Mansfield-Gainesville	44	45.2
Marshfield-Camdenton	69 )	
Marshfield-Mansfield	31 )	149
Rolla-Morrelton	<u>48</u> )	
	371	<u>340</u>

# EXHIBIT B

## 69 KV SUBSTATIONS

<u>Location</u>	<u>As Loaned</u>		<u>As Proposed</u>	
	<u>Voltage - KV</u>	<u>KVA</u>	<u>Voltage - KV</u>	<u>KVA</u>
Stanton	69/*	750	67/*	1,500
Sullivan	69/*/2.3	1,750	67/*	2,500
Bourbon	69/*/2.3	500	-	-
Cuba	69/34.5/*/ 2.3	3,500	67/*	2,000
St. James	69/*/2.3	1,500	-	-
Rolla	69/34.5/*/ 2.3	9,000	67/34.4 34.4/*	15,000 2,000
Newburg	69/*/2.3	1,000	67/*	1,000
Dixon	69/*/2.3	1,000	-	-
Crocker	69/34.5/*/ 2.3	6,000	69/34.5	5,000
Richland	69/*	750	-	-
Stoutland	69/*/2.3	750	67/*	750
Sleeper	69/*	3,000	-	-
Lebanon	69/*/2.3	2,000	67/*	2,500
Conway	69/*/2.3	1,000	67/*	1,000
Marshfield	69/*/2.3	4,000	67/*	3,000
Seymour	69/*/2.3	1,500	67/*	1,500
Mansfield	69/34.5/*/ 2.3	3,000	67/33.5	3,000
Norwood	69/*/2.3	750	67/*	750
Mt. Grove	69/*/2.3	2,500	67/*	2,500
Cabool	69/*/2.3	750	67/*	750
Houston	69/*/2.3	3,000	67/*	3,000
Licking	69/*	1,000	67/*	1,000
Ava	69/*/2.3	2,500	67/*	2,500
Gainesville	69/*	1,000	67/*	1,000
Niangua	69/*	2,500	67 Switching structure only	
Camdenton	69/*/2.3	1,500	67/*	1,500
Maries	69/34.5/*	5,000	Revisions only to present 10,000 kva substation	

\*Distribution Voltage